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EXAMINER	
OLSEN, KAJ K	

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1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/621,637	SHEN ET AL.	
	Examiner	Art Unit	
	KAJ K. OLSEN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-67 and 70-127* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *35-51* is/are allowed.

6)☒ Claim(s) *1-12,29-34,52-64,66,67 and 70-127* is/are rejected.

7)☒ Claim(s) *13-28 and 65* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Res Judicata

1. Claims 1, 2, 9-12, 29-34, 52, 54, and 61-65 of this reissue are identical to the claims 1, 2, 9-12, 29-34, 52, 54, and 61-65 presented to the Board of Appeals in Reexamination 90/006,209. The rejection of these claims was affirmed in the Board decision of 3/28/2007. Hence, the claims 1, 2, 9-12, 29-34, 52, 54, and 61-65 are rejected on the grounds of *Res Judicata* and the applicant is not entitled to further adjudication of the issues concerning these claims.

Specification

2. The examiner has withdrawn the outstanding objection to the specification in view of the amendment of 12/01/2008.

Reissue Applications

3. Claims 66, 67, and 70-127 are rejected under 35 U.S.C. 251 as being broadened in a reissue application filed outside the two year statutory period. In independent claims 66, 67, 73, 76, and 77, the preamble of the claims has been broadened from "for quantitative measurement" in the originally filed claims to "for measurement". In independent claims 78, 112, and 126, the limitation beginning "a first protonic conductive electrolyte," the "sensing electrode reacting" has been broadened to "the sensing electrode *being capable of* reacting" (emphasis added). In independent claims 112 and 126, the limitation beginning "whereby, in a positive ambient concentration", the previous "means detects changes" has been broadened to "means *is capable*

of detecting changes" (emphasis added). A claim is broader in scope than the original claims if it contains within its scope any conceivable product or process which would not have infringed the original patent. A claim is broadened if it is broader in any one respect even though it may be narrower in other respects.

4. Claims 66, 67, and 70-127 are rejected under 35 U.S.C. 251 as being improperly broadened in a reissue application made and sworn to by the assignee and not the patentee. A claim is broader in scope than the original claims if it contains within its scope any conceivable product or process which would have infringed the original patent. A claim is broadened if it is broader in any one respect even though it may be narrower in other respects. See the discussion above the instances of broadening in new claims 66, 67, and 70-127.

5. The previous objection under 37 CFR 1.172(a) (see paragraph 5 from the 5/30/2008 office action) has been withdrawn in view of the specified reel and frame numbers in the supplemental certificate under 37 CFR § 3.73(b) filed on 12/01/2008.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 6-8, 58-60, 83-85, and 118-120 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

8. Claims 6, 58, 83, and 118 are drawn to one of the sensing or counter electrodes being comprised of a film having a thickness in the range of 50-10,000 Å. It does not appear that applicant has support for both this limitation and the limitation that one of the sensing or counter electrodes be comprised of a mixed conductive material. In particular, these limitations of claim 6, 18, 58, 83, 95, and 118 are cited when discussing the applicant's embodiment of an electrode comprising only a metal film. See fig. 6; col. 9, ll. 14-40 and col. 12, ll. 31-40 of the specification. However, fig. 6 does not read on the any of the independent claims 1, 52, 78, and 112 because each of these claims require a combination of proton and electron conductive materials, like disclosed in fig. 7. The specification makes it very clear that the embodiment of fig. 6 differs from fig. 7 in the absence of any proton conductive material (col. 13, ll. 25-27). There is nothing in the originally filed disclosure to suggest that these dimensions of claims 6, 18, 58, 83, 95, and 118 were also to be utilized with the proton conductive material containing electrodes of fig. 7. Furthermore, col. 6, ll. 48-50 states that one could take one of two different approaches to reducing the interface resistance, either introducing mixed proton-electronic conductor "or alternatively" use a thin film electron conductor electrode. Hence, the thin films of claims original claims 6, 18, and 58 were an *alternative* to the compositions of claims 13, 22, and 52 and were not complementary to each other. In fact, the only dimension ever given for an electrode like those for fig. 7 reads well away from the dimensions defined by claims 6, 18, 58, 83, 95, and 118. See col. 8, ll. 64-66 where it states that the sensing and counter electrodes preferably have a thickness of 0.1 mm. This preferred dimension exceeds the range of 50-10,000

Å for an electrode thickness by a factor of 100-20,000. In the originally filed disclosure, the independent claims defined the sensing and counter electrodes generically and would have read on either the electrodes of fig. 6 or 7. However, during prosecution, the electrode embodiment of fig. 6 was surrendered when applicant amended the independent claims to require the inclusion of proton conductive material to the electrode. Claims 6-8, 58-60, 83-85, and 118-120 should thereby be cancelled in response to this office action.

9. The examiner has withdrawn the 112 first paragraph rejection of claims 18 and 95 from the claims listed above because these claims are drawn to the pump electrodes and applicant had support for this limitation in claim 21 of application 08/522,946.

10. Claim 75 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

11. Because much of claim 75 was incorporated into claim 73, much of claim 75 is now redundant repeating limitations already present in the parent claim.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 1, 5, 9, 11, 12, 29-34, 52, 53, 57, 61, 63, 64, 67, 71, 73, 75, 77, 78, 82, 86, 88, 89, 106-113, 117, 121, 123, 124, 126, and 127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey (USP 4,227,984) in view of Uchida (USP 5,474,857), Grot (5,330,860), and/or Vanderborgh et al (USP 4,804,592).

15. With respect to claim 1, Dempsey discloses an electrochemical gas sensor comprising a sensing electrode 13 and a counter electrode 10 both of which are permeable to water vapor and are inherently comprised of electrically conducting material (col. 4, lines 30-64). Dempsey further discloses a first protonic conductive electrolyte membrane 9 permeable to water and situated between and in contact with the sensing and counter electrodes (fig. 2, and col. 4, lines 49-51), and also discloses a means for electrical measurement electrically connecting the sensing and counter electrodes (fig. 3). Dempsey further discloses a means, containing a volume of water (1, 2), for exposing the counter electrode to water vapor (col. 4, lines 39-49). Dempsey does not explicitly disclose the use of sensing and/or counter electrodes having the set forth composition of electron conductive mixed material and proton conducting material, Dempsey did recognize that electrodes set forth in the fuel cell prior art would find utility for the sensor of Dempsey (col. 8, lines 30-63). Uchida teaches a particular electrode for use in fuel cells that comprises a combination of proton conducting material (i.e. Nafion) and carbon and platinum

materials (col. 7, line 55 through col. 8, line 26) that satisfies the claimed percentages (see Reexamination 90/006,209 Request dated 1/29/2002, pp. 4 and 5). Grot also teaches the use of fuel cell electrodes having the claimed compositions (col. 4, line 35 through col. 5, line 2; and col. 14, lines 15-27). Vanderborgh also teaches the incorporation of electrolyte material (polyperfluorosulfonic acid (PFSA)) into the electrode material into the electrode to increase the three phase interface and reduce the electrode resistance. See col. 2, ll. 37-43. Vanderborgh further teaches that such as electrode should includes first and second electrical conductors (C and Pt) that is 82 wt% where the proton conducting material PFSA is 18 wt%. See Table 1 in col. 8. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of any of Uchida, Grot, and/or Vanderborgh for the sensor of Dempsey because these electrodes have shown previous favorable utility in the fuel cell art, and the substitution of one known fuel cell electrode composition for another, when the results are not unexpected, requires only routine skill in the art. Furthermore, the addition of an ionically conductive polymer to the electrodes of Dempsey would improve the electrical properties (e.g. decrease the effective electrode resistance (col. 2, ll. 42 and 43 of Vanderborgh or col. 4, lines 26-29 of Grot). Although Vanderborgh, Uchida and Grot are drawn principally towards fuel cell power sources, both Uchida and Grot recognized the utility of their teachings to include fuel cell sensors like those of Dempsey (see Uchida, col. 10, lines 60-64; and Grot, col. 1, lines 19-30). In addition, Dempsey recognized the utility of teachings from the general fuel cell art for the disclosed sensor (col. 8, lines 30-63).

16. With respect to claim 5, Figure 1 of Dempsey shows opposing surfaces where each surface has a sensing and counter electrode respectively. Moreover, fig. 1 also shows the

working and counter electrodes embedded into the electrolyte membrane resulting in a nonplanar portion of the membrane at the point of the embedding. See fig. 1. This would read on the claimed "substantially nonplanar" membrane giving the claim language its broadest reasonable interpretation.

17. With respect to claims 9 and 11, see Dempsey col. 6, l. 66 - col. 7, l. 16.

18. With respect to claim 12, all of Uchida, Grot, and Vanderborgh taught the use of a combination of carbon and Pt with Pt and C in the claimed ratios. See Uchida, col 7, ll. 59-62; see Grot, col. 14, ll. 15-27; see Vanderborgh, Table 1. Moreover, Vanderborgh explicitly taught the use of carbon black as the preferred source of carbon for the electrodes as it provides a high surface area. See col. 8, ll. 16-28. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize carbon black as the source of carbon for the electrodes of Uchida and Grot as well as carbon black provides a high surface area support that would maximize the utility of the highly expensive Pt metals.

19. With respect to claims 29-34 and the use of the sensor for CO, alcohol, or NOx, see the Dempsey abstract. With respect to the use of the sensor with the gases hydrogen, H2S, and H2O, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. The examiner would note that the applicant gave no other electrode compositions for the detection of hydrogen, H2S or H2O, indicating that the electrodes already set forth for the CO sensor would also be applicable for the other claimed compositions.

20. With respect to claims 52, 57, 61, 63 and 64 (those limitations not covered above) Dempsey also teaches the use of a reference electrode for the sensor (col. 4, lines 60-65) as well

as a reservoir 1 containing both water and water vapor which would expose the counter electrode to both water and water vapor (col. 4, ll. 30-34).

21. With respect to claims 53 and 113, Dempsey teaches a means for applying DC potential across the sensing and counter electrodes. See col. 2, l. 36 - col. 3, l. 38. Although Dempsey does not disclose this DC potential as being for the purpose of transporting gas away from the counter electrode, it would clearly be capable of providing said function.

22. With respect to claim 67, 73, and 75 (those limitations not covered above), because the electrode of Dempsey in view of Uchida, and/or Grot already rendered obvious the combination of catalytic electronic conducting material (e.g. Pt) and ion conducting material (e.g. Nafion) for the electrodes with overlapping composition to the electrodes of the instant invention, then such an electrode would inherently be capable of reacting with a gas in the absence of an applied or biased voltage to the sensing electrode. The fact that Dempsey operates its sensor using an applied voltage to the sensing electrode does not read free of this limitation because whether or not a voltage is applied is how the sensor is to be utilized and does not further define the structure of the device.

23. With respect to claims 71 and 77 (those limitations not covered above), the sensing and counter electrodes of Dempsey are on opposite sides of the first protonic conductive electrolyte membrane. See fig. 1 and 3.

24. With respect to claims 78, 82, 86, 88, 89, and 106-111 (those limitations not covered above), whether or not the sensor is operated at room temperature is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. It is noted however that the sensor of Dempsey can be utilized at room

temperature as evidenced by col. 2, ll. 30-35. Furthermore, the means for electrical measurement of Dempsey is capable of detecting a change in electrical characteristic (i.e. current) in response to a positive ambient atmosphere concentration. See col. 11, ll. 8-30.

25. With respect to claims 112, 117, 121, 123, and 124 (those limitations not covered above), whether or not the sensor is operated at room temperature is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. It is noted however that the sensor of Dempsey can be utilized at room temperature as evidenced by col. 2, ll. 30-35.

26. With respect to claims 126 and 127 (those limitations not covered above), whether or not the sensor is operated as a residential gas sensor merely constitutes the intended use of the sensor and the intended use need not be given further due consideration in determining patentability.

27. Claims 2, 54, 79, and 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of La Conti et al (USP 4,820,386).

28. The references set forth all the limitations of the claims, but did not explicitly recite the presence of antifreeze. La Conti teaches adding materials such as glycols (a well known antifreeze) to the water to increase the effective temperature range for the sensor (col. 11, lines 42-49). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teachings of La Conti for the sensor of Dempsey in view of Grot, Uchida, or Vanderborgh in order to increase the temperature range of the sensor.

29. Claims 3, 55, 80, and 115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Hielscher et al (USP 5,403,452).

30. The references set forth all the limitations of the claims, but did not explicitly recite that the surface area of the sensing electrode is smaller than the surface area of the counter electrode. Hielscher teaches in an alternate gas sensor that the counter electrode 2 should be larger than sensing electrode 1 (fig. 4 for example) so that the counter electrode's current density is less than the measuring electrode's current density. See col. 8, ll. 38-44. This is in accordance with the point the examiner made previously from Reexamination 90/006,209 (see p. 19 of the 7/17/2003 Examiner's Answer) in that it was known to make the counter electrode larger than the sensing electrode so that the counter electrode does not diffusion limit the sensor response. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Hielscher and make the sensing electrode smaller than the counter electrode for the sensor of Dempsey and Uchida, Grot, and/or Vanderborgh in order to ensure that the counter electrode's current density is less than the current density at the working electrode thereby ensuring that the sensing electrode is the diffusion limiting electrode.

31. With respect to the remainder of claims, because the counter electrode of Dempsey is directly exposed to water vapor, the humidity would presumably be at or near 100%. Because the humidity at the counter electrode is greater than the humidity at the sensing electrode, a positive pressure of water vapor would be result.

32. Claims 4, 56, 81, and 116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey and Hielscher in view of Grot, Uchida, and/or Vanderborgh as applied to claims 3, 55, 80, and 115above, and further in view of La Conti et al.

33. The reference set forth all the limitations of the claims, but did not explicitly recite the use of a hydrophobic membrane separating the counter electrode from the water vapor. La Conti teaches that the placement of a water transport film between an electrode and a source of water vapor allows impure water sources to be utilized (such as the antifreeze taught above) (col. 11, lines 42-49). The water transport film used by La Conti is a hydrophobic polytetrafluoroethylene (col. 3, lines 62 and 63). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of La Conti for the sensor of Dempsey, Hielscher, and Grot, Uchida, and/or Vanderborgh in order to prevent contamination of the counter electrode.

34. Claims 10, 62, 66, 70, 72, 74, 76, 87, and 122 (and claims 67, 73, and 75 in the alternative) are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Tomantschger et al (USP 5,302,274).

35. With respect to claims 10, 62, 87, and 122, the references set forth all the limitations of the claims, but did not explicitly recite the use of a hydrated metal oxide protonic conductor electrolyte. Tomantschger teaches in an alternate gas sensor a number of different electrolyte materials useable for gas sensors including a uranyl hydrogen phosphate tetrahydrate (col. 8, lines 37 and 38). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Tomantschger for the sensor of Dempsey in

view of Grot, Uchida, and/or Vanderborgh because the substitution of one known electrolyte means for another, when the results are not unexpected, requires only routine skill in the art.

36. With respect to claims 66, 70, 72, 74, and 76 (those limitations not already discussed above), the references do not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference electrode. However, Tomantschger teaches that it is unnecessary to have three electrodes for the gas sensor as only two are necessary for appropriate sensor operation. In particular, Tomantschger teaches that the gas sensor can comprise only a sensing and counter electrode where the presence of the gas being analyzed is determined based on an induced sensor response. See fig. 8 and 9; col. 9, ll. 1-19; and col. 10, ll. 10-20. Because this configuration of sensor reduces the number of electrodes and reduces the need for an applied potential across the sensor, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the sensor configuration of Tomantschger for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction and operation.

37. With respect to claims 67, 73, and 75 in the alternative, these claims were rejected earlier because the claim language drawn to operating the sensors in a non-biased manner or without applied voltage did not further define the actual structure of the sensor. However, even if these terms were to be interpreted as structurally further defining the claimed sensor, then these claims would be obvious over the further teaching of Tomantschger for the reasons set forth for claims 66, 70, 72, 74, and 76 above.

38. Claims 66, 70, 72, 74, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Nagata et al (USP 4,913,792).

39. The references set forth all the limitations of the claims, but did not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference electrode. Nagata teaches an alternate gas sensor having three electrodes equivalent to the three electrodes of Dempsey (i.e. a sensing (or working) 2, a counter electrode 4, and a reference electrode 3). However, Nagata teaches that the sensor could be constructed without the presence of a reference electrode provided one is willing to utilize a suitably large counter electrode. Nagata further teaches that such a configuration would simplify sensor construction. See col. 7, l. 66 - col. 8, l. 11. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a two-electrode sensor configuration of Nagata for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction.

Allowable Subject Matter

40. Claims 13-28 and 65 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

41. Claims 35-51 are allowed.

42. The indication of allowable subject matter can be found in the previous office action and will not be reiterated here.

Response to Arguments

43. Applicant's arguments filed 12/01/2008 have been fully considered but they are not persuasive.

44. With respect to the *Res Judicata* issue, applicant urges that Dr. Shen's supplemental declaration of commercial success is new evidence and the courts have previously found that new evidence constitutes a new issue. The examiner questions whether Dr. Shen's declaration constitutes new evidence as the Board had previously considered a declaration of commercial success from the applicant (submitted on 2/19/2003 in the 90/006,209 proceedings) and the Board was not persuaded by it as it lacked a nexus between the commercial success and the claimed invention (see the 3/28/2007 appeal decision, pp. 29-31). As the examiner discusses in detail below, applicant's supplemental declaration does nothing to further establish this nexus and this declaration does not appear to establish any new issue meriting removal of the outstanding *Res Judicata* rejection. The examiner notes that in both the *In re Herr* and *In re Russell* cited by the applicant, the evidence in these was of sufficient strength to cause one of the examiner or the courts to withdraw the pending art rejection, and hence clearly met a threshold for new evidence not previously considered. Applicant unsuccessful attempt to perfect a previously submitted declaration would not appear to rise to the level of new evidence as established by the courts and the *Res Judicata* rejection is being maintained.

45. With respect to the broadened reissue claims, applicant urges that the removal of "quantitative" from claims 66, 67, 73, 76, and 77 does not constitute a broadening because a preamble of a claim is generally not considered to be a limitation of the claim. First, the

examiner notes that this argument from the applicant directly contradicts arguments made in the 4/21/2003 appeal brief filed in the 90/006,209 proceedings. In particular, appellant then urged that the examiner had to give weight to the *very same preamble* that the applicant now is urging does not further define the claimed invention (see paragraph bridging pp. 9 and 10 of the 4/21/2003 appeal brief). Applicant's arguments here are inconsistent with previous positions taken. Second, the issue as to whether the preamble further limits a claim is a case by case issue and the preamble oftentimes is deemed to further limit the claimed invention (see MPEP 2111.02). Any change in the language of the preamble might be construed as changing the scope of the claim. On this, applicant appears to be in agreement when applicant hedges that the preamble "generally" is not considered to further limit a claim. Because applicant is outside of the two-year statutory period for broadening of the claims, it is impermissible for the applicant to make any amendment that may further broaden the claims, especially considering the applicant themselves appears to be confused as to the relevance of the preamble to the claim scope. Third, if the applicant is of the opinion that the preamble change does not change the scope of the claim, then it is unclear why the applicant is insistent on the change in the first place. In other words, if the amendment doesn't change the scope of the claims, then why was the amendment made in the first place?

46. With respect to the changing of "reacting" to "capable of reacting" or "detects" to "capable of detecting", applicant urges that this also is not a difference in claim scope because the change was made to avoid possible confusion as to process language. However, if applicant admits that they are attempting to avoid possible confusion about this limitation, then this evidences that applicant's change does indeed affect the scope of the claims. If "detects" and

"reacting" are possibly interpreted differently than "capable of reacting" "capable of detecting", then this change is in fact a change in the scope of the claims.

47. With respect to the 112 1st paragraph rejection of claims 6, 58, 83, and 118, applicant urges that the "at least one" of these various claims means there is no inconsistency between the two ways of constructing the electrodes. As near as the examiner can ascertain, it appears applicant is urging that one of the sensing or counter electrodes could be constructed with electrolyte in the manner of fig. 7 while the other of the sensing or counter electrodes could be constructed with the thin films in the manner of fig. 6. Hence, the situation that the examiner alluded to where one would utilize simultaneously proton conductive electrolyte and the Angstrom thick films would not necessarily be present in an interpretation of (as an example) claims 1 and 6 together. There are a couple of problems with this argument. First, there does not appear to be anything in the original specification to support the applicant's possible interpretation of the claims. In particular, there is nothing in the specification that would give any indication that one could mix and match the two alternative approaches to the electrode construction. In fact, the specification even suggests against such an interpretation when it states at col. 9, ll. 14-19 that "[a]s an alternative to manufacturing counter electrode 14 and sensing electrode 16 from mixed proton electronic conductive materials, a thin film of electrically conductive film, such as noble metal which is deposited upon proton conductive membrane 12 may also be used in replacement for such electrodes" (emphasis added). Hence, the specification only indicated that one could either construct mixed proton electronic conductive sensing and counter electrodes or utilize thin films for both of the electrodes. The specification never suggested doing both simultaneously. It might have been obvious to utilize a combination of

both, but the burden for 112 enablement support is greater than the burden for obviousness. Second, even if this interpretation of claims 1 combined with 6 were a tenable interpretation of these claims, the claims still read in the manner suggested by the examiner in paragraph 8 from the 5/30/2008 office action (reprinted above) and would still lack enablement.

48. With respect to the combination of Dempsey with any of Uchida, Vanderborgh, or Grot, the examiner is utilizing these references in the same manner as they were in the Examiner's answer of 7/17/2003 in the reexam 90/006,209. The examiner was completely affirmed on issues related to this combination in the decision of 3/28/2007, and it is unclear of the relevance of applicant's continued traversal of the combination of Dempsey with any of Uchida, Vanderborgh, or Grot. The claims are rejected under *Res Judicata* and it does not appear that further arguments against a combination meet the threshold of new evidence as defined by *In re Herr* and *In re Russell*. Moreover, the new arguments appear to rely on applicant's interpretation of Nafion as being a "non-hydrophobic binder." This is confusing as Nafion is a well-known hydrophobic polymer. See Razaq (USP 5,322,602) col. 3, ll. 48-52. In fact, Nafion is structurally very similar to the Teflon relied on by Dempsey as both Teflon and Nafion are highly perfluorinated polymers. Hence, it is entirely unclear how applicant came to the conclusion that Nafion was non-hydrophobic.

49. With respect to applicant's arguments concerning La Conti, the examiner's use of La Conti is substantially identical to the use of it in the appealed reexamination of which the examiner was affirmed.

50. With respect to the teaching of Hielscher, applicant urges that Hielscher's sensor is almost diametrically opposed to the principle of Dempsey's sensor. However, it is unclear how

any of these supposed differences between the sensors of Dempsey and Hielscher concern how the teaching of Hielscher is being relied on. In particular, Hielscher is being relied on solely for its teaching that the counter electrode of an electrochemical gas sensor should be larger than the measuring electrode so that the current density at the counter electrode does not current limit the sensor performance. As discussed in paragraph 27 of the 5/30/2008 office action, making sure the counter electrode is not diffusion limited (only the measuring electrode should be diffusion limited) is fundamental to electrochemical sensor performance and this suggestion from Hielscher would be relevant to the sensor of Dempsey irrespective of their other possible differences between these two teachings.

51. With respect to the use of Tomantschger, applicant urges that there is no motivation for Dempsey to go from three electrodes to two electrodes as suggested by Tomantschger because Dempsey relies on its reference electrode to account for temperature variations during zero-air operations. This is unpersuasive for a number of reasons.

52. First, the examiner believes the applicant has incorrectly framed the issue. It appears that Dempsey is utilizing its reference electrode not to minimize the need temperature variation *per se*, but rather Dempsey was attempting to account for the temperature variation that was induced by its use of a reference electrode in the first place. In other words, the reference electrode of Dempsey was the source of the temperature variation and relocating it resulted in a minimization of that problem. There should be no current flow between the sensing and reference electrodes of Dempsey, but some of the flux present between the sensing and counter electrodes did flow to the reference electrode (col. 3, ll. 48-64). If Dempsey were modified to utilize two electrodes instead, then Dempsey presumably would not have had this same problem as there would have

been no third electrode functioning as a reference electrode and hence no third electrode to undesirably receive current. The examiner notes that Tomantschger does not discuss the need for any temperature correction or a problem with temperature variations for its two electrode sensor embodiments.

53. Second, even if the examiner accepted that the reference electrode of Dempsey was the solution to the temperature variation and not the problem as the applicant has framed the issue, it is still unclear how this would render the further use of Tomantschger as unobvious. In particular, Dempsey is trying to minimize measured current variations brought about by temperature variations (abstract). However, the sensor of Tomantschger utilizes its two electrodes as a potentiometric or voltage measurement (col. 10, ll. 44-60). Hence, if one is not even measuring current anymore, then any possible current variations as a function of temperature would be irrelevant. Hence, the entire purpose of the reference electrode of Dempsey would thereby be irrelevant and this reference electrode would not be necessary. As discussed above, the whole reason the current variations were present in the first place in Dempsey was a function of its arrangement of sensing, counter, and reference electrodes and how these electrodes were interfaced with each other to an external voltage source. In the simplified electrode structure of Tomantschger, this problem is irrelevant as there is no external voltage source and no induced current flow between the electrodes.

54. Third, again accepting the interpretation of the purpose of the reference electrode as framed by the applicant, this temperature variation would presumably only be an issue if one utilized the sensor in a varying temperature. If the sensor of Dempsey were configured to operate at only a single temperature (e.g. room temperature), then there would be no need for this

reference electrode. The claims do not require the invention to be useable at multiple temperatures and the specification and claims only suggests using the sensor at room temperature (e.g. see claim 78). If a feature on a device were no longer needed or desired, then it would have been obvious to remove said feature from the device *In re Karlson*, 136 USPQ 184.

55. Applicant further urges that when Tomantschger teaches a three electrode embodiment (fig. 6), the counter electrode appears to no longer be exposed to a volume of scrubbed air. First, it is unclear how applicant came to that conclusion. There is nothing in the text to suggest the counter electrode of this embodiment operates any different than the counter electrode in all the other embodiments, and the mere fact that Tomantschger did not draft fig. 6 to show details that were present in other figures doesn't by itself suggest anything. Furthermore, even if applicant were correct, it is entirely unclear the point of this argument as the examiner is relying on Tomantschger to show that two-electrode sensor embodiments were known in the art (like fig. 3). How the three-electrode embodiment of fig. 6 operates is irrelevant.

56. Applicant's arguments concerning Nagata appear to parallel the arguments made against Tomantschger, namely that Dempsey relies on its reference electrode to account for temperature variations and it wouldn't have been obvious to remove it. This is unpersuasive for the same reasons discussed for Tomantschger above.

57. With respect to the declaration from Dr. Shen, points 1-8 of the declaration either review Dr. Shen's background or review the claimed invention. It would appear that no further comment is necessary about these first eight points. For point 9, applicant attempts to relate the improvements of the claimed invention over the prior art gas sensors. However, it is unclear how any of these cited points explicitly stems from the claimed invention. In particular, point

9(i) urges that the CO sensors operate reliably at ppm level detection at room temperature. This is no different from Dempsey, which also has ppm level detection at room temperature (col. 2, ll. 30-35 and col. 11, ll. 12-19) without having all the features of the claimed invention.

58. Point 9(ii) is drawn to the fact that the CO sensor does not need recalibration during the sensor lifetime. First, this point would appear to be contradicted by the specification where it states that the sensor does not require recalibration because of the use of the solid electrolyte layer (col. 7, ll. 57-61). Dempsey already teaches the use of the same solid electrolyte layer (i.e. Nafion), hence any claimed distinction between Dempsey and the present invention would not appear to be responsible for the absence of the need from frequent recalibration. In fact, there is nothing in Dempsey that gives any indication that its sensor requires frequent recalibration.

59. Point 9(iii) states that the CO sensors of the present do not consume any power. First, most of the rejected claims do not state anything about a power source so this is not a claimed distinction over the prior art. Second, this point is also contradicted by claims 14, 23, and 35, which explicitly state the presence of pumping electrodes and would inherently require a power source. Third, Tomantschger evidences that potentiometric CO sensors (i.e. sensors not requiring a power source) were already known at the time of the invention and that these sensors did not require the use of electrolyte in the measuring electrode. See the discussion of Tomantschger above.

60. Point 9(iv) states that the CO sensors of the present invention have an improved CO detection accuracy and resolution. However, applicant is making this suggestion in the complete absence of any data to support this conclusion. Unless applicant sets forth data comparing the

sensor of the present invention to the sensor of Dempsey, this point by the applicant is entirely speculative and of little use.

61. Point 9(v) states that the CO sensors of the present invention are cheaper to manufacture at a dollar cost. However, the only claimed structural distinction between Dempsey and the present invention is that the present adds Nafion to the electrode instead of Teflon. The examiner presumes Nafion is more expensive that Teflon so it is unclearly unclear how this point relates to the claims.

62. Point 10 concerns the supposed commercial advantages made possible by the claimed features. Point 10(i)(a) and 10(i)(b) concern that the addition of proton conductor to the sensing and counter electrode provides minimal ionic/protonic resistances and provides a high surface area for three phase contact to occur. This was already well known advantage of adding electrolyte to an electrode in the art. In particular, Grot and Vanderborgh already suggested that adding electrolyte to the electrodes lowered the resistance of the electrodes by improving the three phase interface (Grot col. 4, ll. 26-29 and Vanderborgh col. 2, ll. 37-43). Uchida already suggested added electrolyte to the electrodes increased the reaction area (i.e. three phase contact) of the electrode (abstract).

63. Point 10(i)(c) concerns the use of an electrode and electrolyte that are water vapor permeable thereby providing a reduced resistance. However, the electrolyte of Dempsey is the same as the electrolyte of the present invention (Nafion) so there is no distinction there. Furthermore because the electrodes of Dempsey are water permeable, then they are also water vapor permeable as well (col. 7, ll. 50-62). Finally, La Conti already taught that a water transport film can be utilized between a source of water and the electrodes. Hence it was already

known in the art to utilize water vapor instead of water as the source of hydration for the sensor. See the discussion of claims 4, 56, 81, and 116 above.

64. Points 10(ii)(a-c) concern that the sensors do not need recalibration because they are operated at room temperature (a), have a solid electrolyte body (b), and use a mixture of ionic-electronic conductive sensing and counter electrodes (c). Points (a) and (b) are already disclosed by Dempsey and point (c) is already rendered obvious by Uchida, Grot, and Vanderborgh for the same reasons set forth in this declaration. See the discussion of point 10(i) above.

65. Point 10(iii) concerns the fact that sensor does not consume any power. First, as discussed for point 9(iii) above, most of the claims do not even require this and some of the claims (i.e. claims 14, 23, and 35) contradict this point. In fact, only claims 67, 73, and 75 appear to be drawn to an embodiment explicitly lacking any use of a power source. If the claims do not explicitly disclose the supposed commercial feature, then this point cannot be construed as establishing a nexus between the claimed invention and the commercial success. Second, as also discussed for point 9(iii) above, Tomantschger already disclosed that the supposed use of the mixture of ionic/protonic materials for the electrodes was not a prerequisite for operating a sensor without a power source.

66. Point 10(v) (the examiner notes that there was no point 10(iv)) concerns the improved ppm CO detection accuracy and resolution. However, because the declaration and the specification do not disclose one iota of evidence to back this claim of improved accuracy and resolution, this point is entirely speculative and hence entirely unpersuasive.

67. Point 10(vi) concerns that the CO sensors are cheaper to manufacture because (a) they do not need a reference electrode, amplifier, or DC power source; or (b) the use of a solid

electrolyte membrane is simpler. First, point 10(vi)(a) is confusing because applicant even has embodiments of its sensor having a reference electrode (fig. 8, claim 52) and a DC power source (element 42 in fig. 2 or 140 in fig. 4, and claims 12, 23, and 35). Most DC power sources are constructed out of amplifiers. In fact, the embodiments of fig. 3 and 4 actually have more electrodes (4) than the number of electrodes that Dempsey disclosed (3). Second, point 10(vi)(a) ignores the fact that most of the claims of the present invention do not even read away from the use of more than two electrodes with some of the claims explicitly requiring three or more electrodes. The fact that Dempsey discloses the presence of more than two electrodes does not constitute a claimed distinction. Point 10(vi)(b) is irrelevant as Dempsey already disclosed the use of a solid electrolyte membrane.

68. Points 11-15 are drawn to the commercial success of the present invention. However, because there is no persuasive nexus between the commercial success and the claimed invention (see the discussion of points 9 and 10 above), the degree of commercial success described in these points are granted little if any weight on the issue of obviousness.

Conclusion

69. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Kaj K Olsen/
Primary Examiner, Art Unit 1795
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